

and 8-9, in view of U.S. Patent No. 5,286,296 to Sato et al., and further in view of U.S. Patent No. 6,083,566 to Whitesell; Claims 4 and 5 are rejected under 35 U.S.C. §103(a) as being unpatentable over Saito as applied to Claims 1, 6, and 8-9 and further in view of U.S. Patent No. 4,389,970 to Edgerton; Claim 7 is rejected under 35 U.S.C. §103(a) as being unpatentable over Saito as applied to Claims 1, 6 and 8-9 and further in view of Japanese Patent Publication No. 07-142408 to Nakahigashi; Claim 10 is rejected under 35 U.S.C. §103(a) as being unpatentable over Saito as applied to Claims 1, 6 and 8-9 and further in view of U.S. Patent No. 5,735,961 to Shimada; Claims 11-13 are rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,433,785 to Saito in view of Japanese Patent Publication No. 07-142408 to Nakahigashi; Claim 14 is rejected under 35 U.S.C. §103(a) as being unpatentable over Saito and Nakahigashi as applied to Claims 11-13, and further in view of U.S. Patent No. 5,735,961 to Shimada; Claims 15, 16, and 18 are rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,433,785 to Saito in view of U.S. Patent No. 5,286,296 to Sato et al. and in view of U.S. Patent No. 6,083,566 to Whitesell; Claim 17 is rejected under 35 U.S.C. §103(a) as being unpatentable over Saito, Sato et al., and Whitesell as applied to Claims 15, 16 and 18, and further in view of Japanese Patent Publication No. 07-142408 to Nakahigashi; Claim 19 is rejected under 35 U.S.C. §103(a) as being unpatentable over Saito, Sato et al., and Whitesell as applied to Claims 15, 16, and 18, and further in view of U.S. Patent No. 5,735,961 to Shimada; Claim 20 is rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,433,785 to Saito in view of Japanese Patent Publication No. 07-142408 to Nakahigashi; Claim 21 is rejected under 35 U.S.C. §103(a) as being unpatentable over Saito and Nakahigashi as applied to Claim 20, and further in view of U.S. Patent No. 6,083,566 to Whitesell; and Claims 22-25 were withdrawn from consideration.

Turning now to the merits, in order to expedite issuance of a patent in this case, Applicants have now amended Claims 1 and 11 to clarify the patentable features of the claimed invention over the cited references. Specifically, Claims 1 and 11, as amended, recite an apparatus disposed adjacent to a main transfer mechanism for processing a substrate. The apparatus includes a heating process chamber in which a heating process is performed for the substrate, and a load lock chamber, integrally connected to the heating process chamber in a predetermined direction, having an opening closable with a shutter allowing the substrate to be transferred between the main transfer mechanism and the load lock chamber, and controlling at least oxygen concentration and pressure. Also recited is a transferring arm capable of moving in the predetermined direction and transferring the substrate between the heating process chamber and the load lock chamber, and transferring the substrate between the main transfer mechanism and the heating process chamber through the opening, and a gate valve shielding the heating process chamber from the load lock chamber.

With regard to the rejection of Claim 1, the Examiner points out that Saito (USP 5,433,785) has all the elements of the present invention, namely, "a heating process chamber in which a heating process is performed for the substrate, a load lock chamber, connected to the heating process chamber controlling at least oxygen concentration and pressure, a transferring arm transferring the substrate between the heating process chamber and the load lock chamber and a gate valve shielding the heating process chamber from the load lock chamber". However, as recited in the amended Claims 1 and 11, the transferring arm of the present invention is "capable of moving in a predetermined direction" and is NOT configured to "rotate" as in Saito. For this reason, in the present invention, the transferring arm does not require "rotating radius" which means that footprints can be minimized. Moreover, the inner pressure of the heating processing chamber is to be reduced according to the Claims 2

and 3, and the chamber being small indicates that there is only a small amount of gas to be exhausted, that, in turn saves a lot of energy.

Further, in the present invention, the substrate is not transferred directly to the main transfer mechanism from the heating process chamber, on the other hand, the substrate is transferred by the transferring arm to the main transfer mechanism through the opening provided in the load lock chamber. The thermal effect from the heating process chamber can be minimized by not transferring the substrate directly to the outside of the heating process chamber.

Moreover, in Saito, wafers are processed by a plurality of units, in other words, the wafers are "transferred from the wafer cassettes to the wafer boat in the load-lock chamber" (in column 4 line 40 of the specification). To the contrary, the substrate is processed one by one in the present invention as illustrated in a non-limiting example of Fig. 5 and page 14 line 3 of the specification. For these reasons, Applicants assert that the cited reference is structurally different from the present invention as claimed in Claims 1-3.

In Claim 7, the Examiner points out that Nakahigashi (Japanese Patent Publication 07-142408) has "a temperature adjusting portion adjusting a temperature of the substrate on the transferring arm". However, Nakahigashi has a characteristic in "forming a heater in the hand section of the substrate carrier robot which supports the substrate (paragraph 19) so that "the substrate can be prevented from being cooled rapidly by the hand section" (paragraph 21). For this reason, Applicants assert that Nakahigashi does not disclose or suggest the substrate is deliberately cooled on the transferring arm as recited in the amended Claim 7.

In Claim 11, as asserted in Claim 7, the present invention is not intended for "preventing the substrate from being rapidly cooled by the hand section", rather, the present invention is intended to "cool" the substrate on the transferring arm to the temperature of

15°C to 25°C as recited in line 27 in page 23 to line 1 in page 24 of the specification of the present invention. With such structure, the more precise control of the temperature becomes possible, which is a characteristic that neither disclosed nor suggested by Nakahigashi. Thus, Claim 11 also patentably defines over the cited references.

The references cited by Examiner, Saito (USP 5,433,785), Sato (USP5,286,296), Whitesell (USP 6,083,56), Edgerton (USP 4,389,970), Nakahigashi (JPP 07-142208), Shimada (USP 5,735,961) are all apparatuses for performing CVD, however, the present invention is related to an apparatus performing SOD coating process for forming an insulating film. In new Claim 26, Applicants added a limitation that "a first processing block having at least a coating process unit coating a processing solution on the substrate" to clarify that the present invention is related to a SOD apparatus. Further, as recited in new Claim 28, having the load lock chamber disposed between the heating process chamber and the first processing block as in the present invention, the thermal effect that the coating process unit may receive from the heating process unit can be minimized. For these reasons and the reasons stated above with respect to Claims 1 and 11, Claims 26 and 28 patentably define over the cited references.

Thus, Applicants' independent Claims 1, 11, and 26 patentably define over the cited references. Moreover, as Claims 2-10, 13-14 and 27-37 depend from Claims 1, 11, and 26 respectively, these dependent claims also patentably define over the cited references.

Consequently, in view of the present amendment, no further issues are believed to be outstanding in the present application, and the present application is believed to be in

condition for formal Allowance. An early and favorable action is therefore respectfully requested.

Respectfully submitted,

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A handwritten signature in dark ink, appearing to read 'Edwin D. Garlepp', written in a cursive style.

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IN THE CLAIMS

Please amend Claims 1, 9, 11, and 13 as shown below:

1. (Amended) An apparatus disposed adjacent to a main transfer mechanism for
processing a substrate, comprising:
 - a heating process chamber in which a heating process is performed for the substrate;
 - a load lock chamber, integrally connected to the heating process chamber in a
predetermined direction, having an opening closable with a shutter allowing the substrate to
be transferred between the main transfer mechanism and the load lock chamber, and
controlling at least oxygen concentration and pressure;
 - a transferring arm capable of moving in the predetermined direction and transferring
the substrate between the heating process chamber and the load lock chamber, and
transferring the substrate between the main transfer mechanism and the heating process
chamber through the opening; and
 - a gate valve shielding the heating process chamber from the load lock chamber.
9. (Amended) The apparatus as set forth in claim 1,
wherein the transferring arm has a waiting portion [waiting substrate is temporarily
placed on the transferring arm] in the load lock chamber for temporarily placing the substrate
thereon when the heating process for the substrate is performed in the heating process
chamber in a changed processing condition.

11. (Amended) An apparatus being disposed adjacent to a main transfer mechanism for processing a substrate, comprising:

a heating process chamber in which a heating process is performed for the substrate;

a load lock chamber, integrally connected to the heating process chamber in a predetermined direction, having an opening closable with a shutter, allowing the substrate to be transferred between the main transfer mechanism and the load lock chamber, and controlling at least oxygen concentration and pressure;

a transferring arm capable of moving in the predetermined direction and transferring the substrate between the heating process chamber and the load lock chamber, and transferring the substrate between the main transfer mechanism and the heating process chamber through the opening, and performing a cooling process, for the substrate; and

a gate valve shielding the heating process chamber from the load lock chamber.

13. (Amended) The apparatus as set forth in claim 11 [12],

wherein the temperature of the heating process in the heating process chamber is in the range from 400°C to 450°C, whereas the temperature of the heating process in the transferring arm is in the range from 15°C to [250] 25°C.

26-37. (New)